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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of

Federal-State Joint Board on
Universal Service

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Comments of

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Summary

The Benton Foundation offers comments regarding the Common Carrier Bureau's Public Notice on universal service.

- Using Census Bureau statistics from November 1994, Benton finds that basic services included within the definition of universal service are not affordable to all and therefore should not be the baseline for affordability at present. In households with incomes below \$30,000 – over 53 percent of all households in America – telephone subscribership can represent too much of the family's earnings to bear.
- Percentage of income and other "non-rate" factors are critical when determining affordability. When the cost of basic telephone service drops below one percent of household income, the penetration rate begins to exceed 90%. About 99% of all households choose to have basic telephone service when rates fall below .7% of annual household income.
- Discounts and support for schools, libraries, and health care providers should be structured to allow the greatest range of choice to the public institution. The decisions concerning what services and functionalities are needed in these areas should be left to professionals in these relevant fields, not telecommunications regulators.
- In Section 254(h) of the Telecommunications Act, it is the plain intent of Congress to connect classrooms, not just to reach the school house door. For the intent of Congress to be met, the inside wiring should be supported as part of the universal service mechanism.
- Sections 706 and 708 are important legislative steps towards facilitating the goals of advanced telecommunications access to all Americans and equal learning opportunities for America's school children. The fulfillment of these goals set forth in Sections 706 and 708, however, relies on the successful implementation of 254 (h). As such, the provisions of 706 and 708 are important elements but cannot be relied upon to provide advanced services in the absence of a successful conclusion of this Joint Board's work in establishing underlying connections.
- The Commission should narrowly construe the legislative prohibition on the resale of telecommunications services by public institutions so as, for example, to permit end-user cost based fees for services.
- Most states have programs to provide telecommunication services to schools and some have extended services to libraries and health care providers. In order to support use of these services, some states have offered additional discounts to institutions using these facilities. Attached as Appendix II to this filing is an overview of state strategies for connecting schools, which take many different forms.

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I. Introduction

At the request of the staff of the Federal-State Joint Board, the Common Carrier Bureau seeks further comment on specific questions related to universal service. In line with its areas of expertise, the Benton Foundation ("Benton") submits these answers to the Joint Board's questions relating to definitions issues and public institutions.

Benton, a nonpartisan, private foundation committed to strengthening public interest efforts in shaping the emerging National Information Infrastructure, believes that communications in the public interest, including the effort to connect all Americans to basic communications systems, is essential to a strong democracy. Benton's mission is to realize the social benefits made possible by the public interest use of communications. Benton bridges the worlds of philanthropy, community practice, and public policy. It develops and provides effective information and communication tools and strategies to equip and engage individuals and organizations in the emerging digital communications environment.

Over the past two years, the Benton Foundation has commissioned a number of research papers on the subject of universal service and now hosts the World Wide Web's most comprehensive library of universal service and access documents.¹

¹ See URL <http://www.benton.org/Uniserv/>

II. Definitions Issues

1. Is it appropriate to assume that current rates for services included within the definition of universal service are affordable, despite variations among companies and service areas?

Using Census Bureau statistics from November 1994, Benton finds that current rates for basic service are not affordable to all and therefore should not be the baseline for affordability. *Universal Service: An Historical Perspective and Policies for the 21st Century*, a recent publication of the Consumer Federation of America and Benton (attached as Appendix I), shows that telephone subscribership rises steadily with income and stabilizes at 99 percent when household income reaches \$30,000. In households with incomes below \$30,000 – over 53 percent of all households in America – telephone subscribership can represent too much of the family's earnings to bear. Our research also shows that although households with incomes less than \$15,000 represent 28 percent of all US households, they represent nearly 69 percent of the households without telephone service. Eighty-three percent of households without telephone service have incomes below \$30,000. These statistics illustrate that current rates for services included within the definition of universal service may still leave 53 percent American households at risk for not being able to afford basic service.

2. To what extent should non-rate factors, such as subscribership level, telephone expenditures as a percentage of income, cost of living, or local calling area size be considered in determining the affordability and reasonable comparability of rates?

Such "non-rate factors" are critical in determining affordability. Indeed, without these factors, there would be no mechanism for gauging affordability. Specifically, the report mentioned above shows that when the cost of basic telephone service drops below one percent of household income, the penetration rate begins to exceed 90%. About 99% of all households choose to have basic telephone service when rates fall below .7% of annual household income. Such benchmarks are

critical for determining whether rates for basic service will meet the affordability test mandated by Congress.

III. Schools, Libraries, Health Care Providers

6. Should the services or functionalities eligible for discounts be specifically limited and identified, or should the discount apply to all available services?

Support should be structured to allow the greatest range of choice to the public institution. The decisions concerning what services and functionalities are needed in these areas should be left to professionals in the relevant fields, not telecommunications regulators.

7. Does Section 254(h) contemplate that inside wiring or other internal connections to classrooms may be eligible for universal service support of telecommunications services provided to schools and libraries? If so, what is the estimated cost of the inside wiring and other internal connections?

The clear intent of Congress is not just to connect schools, but classrooms as well. If Section 254(h) does not address inside wiring or internal connections, it will be little more than an empty promise to the nation's public institutions.

The plain language of Section 254(h)(2)(A) clearly directs the Commission "to enhance, to the extent technically feasible and economically reasonable, access to advanced telecommunications and information services for all public and nonprofit elementary and secondary school *classrooms*, health care providers, and libraries" (emphasis added). Similarly, in Section 706(a), the Commission and State regulatory commissions are charged to "encourage the development on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and *classrooms*)" (emphasis added).

The report language that accompanies the Act is fully consistent with this understanding. The Joint Explanatory Statement of the Conference Committee states, in relevant part:

New subsection (h) of section 254 is intended to ensure that health care providers for rural areas, elementary and secondary school *classrooms*, and libraries have affordable access to modern telecommunications services that will enable them to provide medical and educational services to all parts of the Nation.

The ability of K-12 *classrooms*, libraries, and rural health care providers to obtain access to advanced telecommunications services is critical to ensuring that these services are available on a universal basis. (104th Congress, 2d Session, Report 104-458 at 132, emphasis added.)

In each case, it is the plain intent of Congress to connect classrooms, not just to reach the school house door. For the intent of Congress to be met, the inside wiring should be supported as part of the universal service mechanism.

8. To what extent should the provisions of Sections 706 and 708 be considered by the Joint Board and be relied upon to provide advanced services to schools, libraries and health care providers?

Sections 706 and 708 are important legislative steps towards facilitating the goals of advanced telecommunications access to all Americans and equal learning opportunities for America's school children. The fulfillment of these goals set forth in Sections 706 and 708, however, relies on the successful implementation of 254 (h). As such, the provisions of 706 and 708 are important elements but cannot be relied upon to provide advanced services in the absence of a successful conclusion of this Joint Board's work in establishing underlying connections.

10. Should the resale prohibition in Section 254(h)(3) be construed to prohibit only the resale of services to the public for profit, and should it be construed so as to permit end user cost based fees for services? Would construction in this manner facilitate community networks and/or aggregation of purchasing power?

The Commission should refrain from enacting extensive prohibitions on the resale of telecommunications services by public institutions. While a restriction on resale of services for

profit would appear to comport with the intent of Congress, the resale prohibition should be construed narrowly so as to permit end-user cost based fees for services. Such an outcome would be consistent with the means by which school districts and library systems may purchase services and allow the purchasing agency to fairly recover costs associated with providing the service. Indeed, an approach that allowed a lead institution to buy the service and distribute it would result in lower costs to achieve the goal of the provisions and thereby a lesser burden on whatever funding mechanism is designed to meet these goals.

17. How should discounts be applied, if at all, for schools and libraries and rural health care providers that are currently receiving special rates?

After determination of discounts public institutions will receive, the institution receiving a special rate should pay the lesser of these two rates.

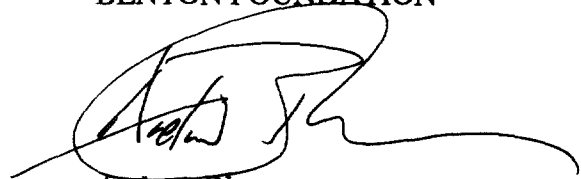
18. What states have established discount programs for telecommunications services provided to schools, libraries, and health care providers? Describe the programs, including the measurable outcomes and the associated costs.

Most states have programs to provide telecommunication services to schools and some have extended services to libraries and health care providers. In order to support use of these services, some states have offered additional discounts to institutions using these facilities. Attached as Appendix II to this filing is an overview for state strategies for connecting schools, which take many different forms. The material comes from a joint publication of the Center for Policy

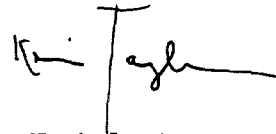
Alternatives (CPA) and Benton, *State and Local Strategies for Connecting Communities: A Snapshot of the Fifty States*. The report is available on-line at URL <http://www.benton.org/State/>.

Respectfully Submitted,

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Appendix II

State Strategies for Connecting Public Institutions to Telecommunications and Information Services

**(Excerpts from Benton's and the Center for Policy Alternative's
*State and Local Strategies for Connecting Communities:
A Snapshot of the Fifty States*)**

18. What states have established discount programs for telecommunications services provided to schools, libraries, and health care providers? Describe the programs, including the measurable outcomes and the associated costs.

Arizona

AzEdLink is the current Internet access service for the K-12 educational community. For an annual fee of \$35, public school instructional, administrative, and support staff as well as affiliated community members and students dial in by computer modem for full Internet access. The service currently has a total of 3,000 users. The toll-free number used in the pilot program has been discontinued due to traffic and cost, but Flagstaff, Phoenix, Tucson, and Yuma all have local access numbers.

Arkansas

ArkNet was established in 1991 as a consortium of higher education institutions (private and public) connected by digital access. Almost 50 educational institutions and libraries are connected through ArkNet, which provides access to a number of schools by sharing costs and infrastructure. ArkNet also administers Internet and online computer services for some state agencies, as well as for university campuses.

The **Arkansas Public School Computer Network (APSCN)** provides network services to Arkansas public schools. APSCN has been working with Southwestern Bell on statewide infrastructure development as part of a Public Service Commission overearnings stipulation. Many local school districts are using commercial service providers or postsecondary educational networks while waiting for their APSCN connections. Although APSCN appears to be used primarily for administrative applications of K-12 schools, an Internet connection is available for education research. About 40 percent of the state's 1,500 K-12 schools are connected to the network, with plans to connect most schools by the end of 1996.

The **Arkansas Educational Television Commission** was awarded a 1994 National Telecommunications and Information Administration grant to build a community information network in the Helena-West area. The model establishes an integrated computing network containing a school information center, a teleconference center, and public access computers placed strategically throughout the community. The project is intended to demonstrate how telecommunications can be used to electronically link rural communities to local, state, national, and international information services. Eighteen activities and programs are planned under the project, including the creation of a wide area computer network that will serve two towns.

California

In 1989 the California legislature established the **California Planning Commission for Educational Technology** to develop a master plan for a statewide telecommunications program to enhance education. The commission includes representatives from the State Board of Education, California State University, community colleges, teachers, the telecommunications industry, and the California Post-Secondary Education Commission.

The **Department of Education's Educational Technology Office** oversees many telecommunications programs directed at education. The office works with telecommunications leaders in the governor's office and with the Department of Information Technology to help encourage counties to set up programs and create Internet sites. The Educational Technology Office also runs programs that help train and connect teachers and staff from different school districts with one another.

Uses of telecommunications technology at the primary and secondary school levels vary by district and school. Many California schools provide computers for their students, and some have established networks, dial-up bulletin boards, or Internet connections. For example, the Electronic Information Magnet School, a secondary school created in 1994, is one of a handful of schools in the Los Angeles Unified School District that is connected to the Internet. However, as the governor's Council on Information Technology noted, schools often create telecommunications projects without adequate staff training, without planning for ways to integrate the new systems with the curriculum, and without adequate technical support.

Projects tend to be more sophisticated at the higher-education level. California has experimented with distance learning, in which lectures are transmitted to students located at several sites. Twenty-two California State University campuses, for example, are wired to allow students and faculty to communicate and hold lectures using video technology. The Northridge campus uses the technology to provide counseling services to students at the Ventura campus, an hour away. The California Polytechnic State University offers math and English classes to students at a working agricultural facility 200 miles away. California State University in San Diego has connected Escondido High School to its network so that advanced students at the high school can take college-level classes with university professors. The university also uses the technology to provide accreditation courses for instructors, to interview prospective faculty members anywhere in the world, and to hold meetings.

Other programs allow students to access information on their computers. Each campus in the University of California and California State University systems has established an Internet presence for the easy exchange of information. About 40 percent of the state's community colleges are also online. Students communicate with their professors by email and can access administrative and library information.

In its report, the Council on Information Technology urged the state to train students to use computers, to expand the choice of courses and teaching resources through telecommunications technology, and to promote parental involvement using email and voice mail. The council also urged schools to expand community access to computer technology by opening facilities to the community after school hours and creating take-home computer programs for students. The council further recommended that new teachers be required to meet competency standards in computer-based applications by the beginning of the 1997 school year.

Colorado

The **Colorado Learning Network**, developed over three years by the Colorado Telecommunications Advisory Committee, provides leadership in distance learning throughout the state. It serves as a clearinghouse for information, provides consulting services for members, conducts funding research, and serves as a financial agent for grants.

Four Colorado high schools (Bennet, Byers, Deer Trail, and Strasburg) collaborated to establish the **Interactive Learning Network**, a fiber optic video network that pools the teaching resources of the four schools, thus allowing junior and high school students access to a greater range of courses as well as some community college courses. The four schools negotiated with telephone companies for a ten-year lease of the fiber. They received two grants that covered about half the cost of laying the cable, and paid the rest of the project cost themselves.

Distance learning for graduate students will be available through the Colorado Springs campus of the University of Colorado beginning in the fall of 1996. Classes will be conducted through

television broadcasts, fax, email, and videotapes in partnership with a private company, Mind Extension University.

Connecticut

Proposals to furnish educational and administrative agencies with videoconferencing equipment and support services are under evaluation.

Connecticut's **Joint Committee on Educational Technology** assists the State Board of Education and the Board of Governors for Higher Education in coordinating more effective and efficient use of educational technology. This committee is responsible for overseeing the distribution of a \$10.4 million bond authorization for technology infrastructure for the state's public schools.

Connecticut's schools so far use very little telecommunications technology, apparently because they do not have enough phone lines available, as well as because of cost barriers.

Delaware

The state plans to connect all middle and high schools and all school administrative offices to the Internet by the end of 1996. Half of the libraries in the state now have Internet access.

Florida

The use of telecommunications technology in Florida schools is limited. Reports in spring 1995 indicated that although teachers are interested in obtaining Internet access for classrooms for teaching and research, financial and bureaucratic obstacles are discouraging.

Florida Atlantic University is joining Jupiter Community High School on the **Palm Beach County Geographic Information Systems Project**, a curriculum using Geographic Information Systems (GIS) technology for environmental and earth education in grades 9-12. This curriculum is said to be the first of its kind in the nation. Students analyze spatial data relating to local environmental issues such as the Everglades Restoration Project and visualize and manipulate "what if" scenarios leading to workable solutions, drawing on skills crucial to the development of higher-level thinking. The curriculum provides important interdisciplinary links by expanding from science into social science and mathematics. The GIS course is currently offered to Jupiter Community High School honors students interested in the sciences, social science, and mathematics by teacher recommendation only.

Teachers participated in 60 hours of initial training that included hands-on use of computers, culminating in the development of the two-semester curriculum. Teachers also participated in fieldwork on environmental conservation and water management. Florida Atlantic University has instituted a Master's degree program in Curriculum and Instruction in Environmental Education that includes mandatory GIS and GIS-related course work.

Hawaii

Hawaii FYI is an interactive network and online information service established by a state initiative in 1991. The Hawaii FYI network collaborates with the Department of Education to provide information service to schools. The telecommunications and network plan are incorporated into the state's education plan.

Cable television franchises have begun working with the Department of Education to plan and build the **Institutional Network** to put schools online and provide access to Hawaii FYI, with the ultimate aim of connecting all schools.

Idaho

Idaho State University began offering 21 distance learning courses in 1995 as a result of a grant of nearly \$1 million from the U.S. Department of Commerce's Economic Development Administration (EDA). The grant will be used to expand the university's network to include video and data connections to high schools and community learning centers in eight towns in southern Idaho. A similar program at Eastern Idaho Technical College is funded by the EDA, the state, and many foundations and individuals. During the summer the college's network will be available for businesses and community organizations to conduct workshops.

The Public School Technology Grants Program, part of the **Idaho Educational Technology Initiative**, provides funds to local school districts to promote information resources, information technology use, and education related to information technology use. The purpose of the grant program is to "provide Idaho classrooms with the equipment and resources necessary to integrate information age technology with instruction and to further connect those classrooms with external telecommunications services."

Illinois

The **Illinois Distance Learning Foundation** is a state agency established to promote the use of technology in rural school districts. So far, most school districts have been reluctant to accept grants from telecommunications companies to install fiber optic lines for interactive distance learning systems. Rural educators and superintendents say that the long-term line fees (\$1,500-2,000 a month) are too expensive. However, a few pilot projects have commenced around the state, with the initial costs being covered by technology companies.

Indiana

State contracts provide Internet access for K-12 schools. **Access Indiana** is intended to expand to include distance learning programs for schools in remote areas. A grant program pending in 1996 would provide up to \$10,000 of state funds to match local cash funds for any Indiana School Corporation to purchase Internet service from the two Access Indiana providers.

The **Indiana Higher Education Telecommunication System (IHETS)** is a state-funded consortium of all 39 public and private universities and colleges, at a total of 77 campus sites, for the sharing of voice, video, and data networks. IHETS manages **INDnet** (Indiana's Internet backbone), the **Indiana Partnership for Statewide Education** (collaborative development and delivery of distance learning), and Access Indiana.

Iowa

The **Iowa Communications Network (ICN)**, also known as the Iowa Educational Telecommunications Network) is a state-owned and -controlled 3,000-mile fiber optic network created in 1993 to connect Iowa's 99 counties with data, voice, and video services. The estimated cost of construction of the backbone, about \$85 million, is being shared by several contributors. The state has committed \$5 million a year for five years, and federal grants and other forms of financing are also being used. Some users will pay fees. The average cost of operation for each site is estimated to be about \$18 an hour.

The network maintains 129 video sites in school districts, libraries, and government offices across the state. The system is designed to serve the administrative needs of state government and to provide services to public and private educational users. Educational users and educational applications are given the highest priority.

The ICN is mainly used for educational purposes. Many college and university classes are scheduled on the network so that students can take advantage of distance learning. Class schedules are available through Iowa public television and through each region or university for programs originating from those sites.

Kentucky

The **Kentucky Education Technology System (KETS)** is mandated by the legislature to provide a data and video communications network to all 176 school districts and 1,366 schools to facilitate information sharing. Internet access to all school districts was completed by August 1995. District office connections function as the hub for connection of all the schools in the district. KETS uses the state's network to connect nearly 1,400 schools for distance learning.

KETS has a satellite system that can broadcast directly to satellite receivers at any point within the state and that provides training sessions, seminars, and presentations to Kentucky businesses. About 200 satellite receiving sites also have interactive equipment for teleconferencing.

The Department of Information Systems is the hub for the **Kentucky Telelinking Network**, which comprises 22 interactive video sites. Next year, 48 additional sites will be built, funded half by the state and half by matching funds from the Star Schools Program federal grant. The federal grant for the first year is \$8 million.

Louisiana

In October 1994 a consortium that included the Louisiana Department of Education received a \$564,000 grant from the National Science Foundation to develop a state education technology plan and to integrate Internet resources with K-12 instruction. This consortium is now known as the **Goals 2000/LaNIE Project**. In addition, in 1995 the Louisiana legislature passed a joint resolution endorsing the use of information technology in all Louisiana public schools.

Louisiana State University led a consortium of higher education institutions that won a federal Department of Education grant worth more than \$2 million to begin networking Louisiana's educational library system. Every county library in the state now has terminals connecting it to other libraries and to the **Louisiana Wide Area Network (LANET)**. The state began funding LANET's operating expenses when the grant money was exhausted.

LANET is now managed by the Office of Telecommunications Management through a network operations center in Baton Rouge. Subscribers, which include state agencies, higher education institutions, K-12 schools, and local governments, are billed monthly at a flat rate.

Maine

After two years of planning the **Community College of Maine Network** was constructed in 1989 at a cost of \$7.3 million. This statewide distance learning network uses fiber optic cable, point-to-point microwave, and interactive television to provide instruction to 4,000 students at more than 47 locations.

The network uses a combination of course grades, demographics, and student surveys to assess its impact on students' attitudes and achievements. Evaluation reports in fall 1990 indicated that 60 percent of CCM students were over 30 and 74 percent were female. The spring 1991 report concluded that student achievement was comparable to that at origination sites.

Maryland

The University of Maryland has been developing a demonstration **Internet Resource Center** in

conjunction with K-12 science and ecology programs statewide and the state Department of Education. The project will link several K-12 access points, the Internet Resource Center, and the Chesapeake Bay Observing System for real-time science and ecology information.

Bell Atlantic is connecting Maryland schools with a fiber optic distance learning network. The network will offer two-way video and audio links and has been piloted in about 20 schools and colleges. Bell Atlantic has offered to jump-start the network by equipping one distance learning classroom at every public high school, community college, and four-year public college in the state, at a cost of \$50,000 per classroom.

Canon Middle School in Baltimore is offering a home-to-school messaging service that lets parents telephone the school and receive prerecorded information 24 hours a day through a voicemail system. The school can also send messages to parents through an automatic dialer. The system can help inform parents and students about homework assignments, absenteeism, Parent-Teacher Association or other meetings, and individual student problems. An evaluation of the system revealed that 60 percent of students' homes access the weekly homework information. Since the service was introduced, homework completion has increased dramatically, student tardiness has dropped by more than 50 percent, and attendance has increased 5 percent.

Massachusetts

The **Massachusetts Education Computer Network (MECN)** manages and operates **MassNet**, a statewide data communications network that connects 29 public higher education campuses. MassNet colleges and universities are also linked to the Internet through NEARnet. MECN reports to the **Massachusetts Higher Education Coordinating Council**.

The **Massachusetts Corporation for Educational Telecommunications (MCET)** was established by legislative mandate in 1982 to provide telecommunications services to Massachusetts students and educators. MCET is a quasi public agency that receives funding from both state and federal governments. School districts pay an initial \$2,000 access fee plus a \$1,000 membership fee for the first year to join MCET. The membership fee is \$1,250 for the second year and \$1,500 for the third. In addition to educational programs, MCET offers daily satellite broadcasts, email and Internet links, videotape and videodisc programming, technical training, and content support advising. Its customer base has expanded to include nonprofit corporations, government agencies, and private businesses.

The Massachusetts Executive Office of Education received a 1994 NTIA project grant for its proposal to construct the **Massachusetts Information Infrastructure (MII)**. MII will coordinate the activities of the Office, MECN, MCET, and the Board of Library Commissions to develop a statewide, integrated, interactive voice and data network. Twenty sites have been connected under the terms of the grant out of a projected total of 352 throughout the state. MII sites include K-12 schools, higher education institutions, libraries, local government offices, health services, and community organizations.

The state recently issued contracts to vendors, marking the first steps in its \$60 million **Mass Ed Online Project**, which will provide all public school students with timely computer learning tools. By 1998 Ed Online is expected to link all 40,000 public schools and about 100 universities and colleges. MCET is overseeing the project.

Michigan

Michigan has a relatively well-developed telecommunications infrastructure, partly as a result of the 1990 Michigan Telecommunications Act (MTA). The MTA encouraged the development of

distance learning networks for schoolchildren by stimulating partnerships between telecommunications providers and allowing schools to operate networks without regulations. Thirty-four percent of Michigan's school districts currently use distance learning, and another fifty-one percent are considering it.

The eastern part of Upper Peninsula, a remote area, has a major distance learning program that connects ten schools, enabling students in schools with as few as 140 students to participate in distance learning courses. The program was cooperatively developed by three phone companies and a cable television company. Schools in southeast Michigan are also using distance learning networks to connect classrooms and improve educational quality.

Minnesota

Minnesota Net (MNet), Minnesota's state government network, was created in 1989 to provide voice, data, video, and other telecommunications transmission services to schools, libraries, public corporations, and federal, state, and local government agencies. MNet is prohibited from reselling or subleasing any services or facilities to nonpublic entities except private schools and colleges, and is required to sell its services to government and other defined users at cost. The backbone network uses the **Minnesota Equal Access Network (MEANs)**, which was developed and is owned by a consortium of 60 telephone companies. MEANs provides its subscribers with fiber optic data transmission and access to all long-distance providers. The **Minnesota Regional Network**, founded in 1987 by the National Science Foundation, provides MEANs with its connection to the Internet.

Technology and Information Educational Services is a consortium of 49 school districts of K-12 schools in Minneapolis-St. Paul and surrounding suburbs that provides schools with technology such as grading software and wiring for computers. The program also trains more than 15,000 teachers a year to use the new technology in the classroom. Funding comes from the school member districts; some richer districts subsidize poorer ones.

The **Internet for Minnesota Schools** program provides Internet access to Minnesota teachers in K-12 schools. More than 2,000 teachers now have access to the Internet through this program. The program developed through a collaboration of **Technology and Information Educational Services** (which funds the program through a grant from the state), the **Minnesota Regional Network**, and the Minnesota Department of Children, Families, and Learning.

The 1995 legislature appropriated \$10.5 million in grant money to expand the use of technology in school districts and libraries. Specifically, the program will provide interactive distance learning applications to all school districts that currently lack them and Internet access to all schools and libraries. The legislation also established a committee to review applications for telecommunications grant money from local school boards. The **Minnesota Education Telecommunications Council**, a state agency, oversees administration of the grant. The recently restructured council held its first meeting in September 1995. The council was originally assigned \$6.1 million to connect colleges and universities statewide through MNet.

Mississippi

Mississippi is currently working to put schools, hospitals, and libraries online, and state policymakers are providing incentives to this end: counties that promote telecommunications training receive a 50 percent tax credit and a 25 percent funding credit for training programs. State law gives certain telecommunications enterprises tax exemptions and tax credits.

FiberNet 2000 is a statewide pilot project that targets rural needs. The project was created to help solve rural problems, most relating to the lack of educational opportunity for rural students. High-level public officials from state education work in partnership with five private telecommunications and computer companies, including Apple.

The FiberNet 2000 system connects four rural high schools, the state university, other specialized secondary schools, and the state's educational television network. Each participating school has an electronic classroom equipped with transmitting and receiving equipment and advanced educational software. The system allows multichannel interactive audio, video, and data communication between students and teachers at each location. Thus a teacher in any of the high school or university locations can conduct a class at any or all of the four high schools simultaneously.

New broadband switching technology allows FiberNet 2000 to use the public network telephone, which will lower costs and increase flexibility. Only the last mile of fiber optic cable that reaches each school had to be installed for the project. The network is used during the day to teach classes, and at night is available for staff development, graduate courses, and adult literacy training.

Missouri

Every college and university in Missouri is linked to the Internet through the **Missouri Research and Education Network (MOREnet)**. MOREnet has provided Internet services to the public since 1990, and has expanded to include elementary and secondary schools, public libraries, and state government. Funding was approved in 1994 to ensure that every school and public library would be connected to MOREnet within three years.

Cooperative efforts among public schools and broadcast and cable video service providers have created the **Cable in the Classroom** initiative, which provides free basic cable service and more than 535 hours a month of commercial-free educational programming to more than 1,600 schools throughout the state. Cable companies in the St. Louis suburban area are providing three cable channels devoted to local elementary and high school curriculums.

Interactive video service networks have been set up in several communities. The **Western Missouri Educational Technology Consortium**, the **Missouri Interactive Telecommunications Education Network (MIT-E)**, **Education Plus**, the **Missouri School Board Association's Education Satellite Network (ESN)**, and the **University of Missouri Interactive Television network** have all provided interactive distance learning services to universities and high schools.

Montana

In 1989 the legislature passed the School Equalization Act, designed to provide more educational opportunities to a dispersed population. This law created and funded the **Montana Educational Telecommunications Network (METNET)**, a system providing satellite television programming, a bulletin board system, and videoconferencing. Using METNET Montana schools can transmit accredited programming in subjects such as Japanese, Russian, and mathematics to remote students through a satellite link. Other programming allows teachers in service to take recertification courses without traveling to a state college or university. METNET also runs an education professionals' online computer network. METNET has videoconferencing studios in six Montana cities, most located at universities. These initially provided only one-way visual and two-way sound services, but METNET is upgrading systems to provide full two-way interaction through the use of compressed video technology. This service is partially supported by user fees ranging from \$55 to \$170 an hour, depending on the quality, with a discount for educational users. METNET is funded by a combination of state funds and matching funds from the private sector.

Nebraska

In 1995 the Nebraska legislature passed LB 860 establishing the **School Technology Fund** and stipulates that by June 30, 2000, all K-12 public school districts and affiliated school systems will have direct connections to a statewide public computer information network.

School administrators have interpreted LB 860's wording to mean that schools should have Internet access by 2000 and have proceeded accordingly. Lottery funds have been used to connect about one-third of Nebraska's schools, amounting to 300 districts. More than 15,000 public schoolteachers now have Internet accounts with email capability.

Educational telecommunications programs are delivered across Nebraska by the **Neb*Sat** satellite system. **Neb*Sat** carries a number of signals simultaneously among Nebraska's schools, government, and educational administrative offices. The **Nebraska Educational Television Network (NETV)** uses **Neb*Sat** to provide informational and distance learning programming to K-12 schools statewide.

Four years ago the **Nebraska Educational Telecommunications Center** (a subsidiary of the statewide public television networks) purchased a satellite transponder to use solely for educational programming. Today, the transponder beams NETV programs across the United States and allows Nebraska's colleges and universities to provide distance learning across the state and around the country. Other programs run by the center include a multichannel closed-circuit system between NETV headquarters and the University of Nebraska at Omaha and the Nebraska University Medical Center, and **EduCable**, a channel carried by two-thirds of the state's cable systems that offers full coverage of the state legislature.

The use of digital information within a community education curriculum is being studied by a coalition headed by the **Nebraska Educational Telecommunications Commission**. The commission has established pilot projects in three communities to model potential community-based online information systems.

Nevada

1995 Nevada legislation SB 204 appropriated \$8 million from the general fund to purchase computers and provide related communications services (including Internet access) to Nevada universities, colleges, and K-12 schools, and to increase the use of interactive video for education.

NevadaNet, a high-speed data communications infrastructure for higher education within the state, was created in 1988 by the University and Community College System of Nevada with support from the National Science Foundation. The network's main purpose is to transmit and share information between academic and research organizations; it does not offer connections to individuals. By 1994, however, NevadaNet had become a service provider for a number of other public agencies, including libraries and the **Nevada School Network**.

NevadaNet maintains a statewide digital network supporting data, video, and voice communications, and currently serves 16 main and satellite campuses with data and interactive video services. There are also at least 12 video sites, and many more sites with data access to the network and the Internet. As part of the 1995 Nev. SB 204 legislation, the infrastructure will be expanded to serve all K-12 schools in Nevada, most likely through a combination of direct and dial-up connections.

New Hampshire

A private company, the **Center for Resource Management, Inc.**, has obtained a three-year grant from the U.S. Department of Education's Technology Education Program to develop the **New Hampshire Electronic Learning Network**. The network will help schools get on the Internet by training teachers to use it. K-12 schools are locally controlled and funded; thus efforts to use distance learning or gain access to the Internet are made at the local level. Schools want the telephone company to subsidize access and equipment.

New Jersey

Bergen County is a relatively wealthy community facing declining school enrollments at the same time that parents are demanding improved curriculums. To address this problem the county, in partnership with New Jersey Bell, created the **Bergen County Interactive Television Network** for local schools in 1990. The fiber optic network allows various districts in the county to share classes (and costs for them) in specialized subjects such as Korean, robotics, and music theory. The system now serves 24 high schools and two colleges.

Building on the Bergen County network, other New Jersey schools made 1995 an explosive year for the development of distance learning. In 1994 other districts and counties began developing interactive television systems, with one county going so far as to finance its \$1.5 million network with a ten-year county bond rather than assemble a system piecemeal. In April 1995 Governor Whitman implemented a \$350,000 grant program to provide \$35,000 each to ten districts to help pay for interactive technology. In June the state Board of Public Utilities approved Bell Atlantic's proposal to provide statewide interactive television service, which will provide the infrastructure for school connections and cap monthly service rates at \$1,000--\$1,350. Most schools now pay about \$700 a month for their connections. Schools must still raise about \$50,000 to establish the necessary equipment at each site. As new participants come online, they connect to the Bergen County network.

New Mexico

Technet provides free Internet access to every public and private K-12 school in New Mexico using local dial-up accounts (including toll-free access). Using Technet, teachers and librarians can access the Albuquerque County Public Library, the Electronic Tribune, proposed state educational legislation, the Albuquerque Museum of Natural History, and CNN News Plans for Teachers. Other services include the University of New Mexico's Teen Outreach Program, the American Indian Scientists and Engineers Society databases, New Mexico's Comprehensive Regional Center for Minorities Outreach Database, a bulletin board for educators, and worldwide library and reference services.

The **New Mexico Educators' Communication Network** provides interactive video classes that are coordinated among three state research universities and national laboratories over the statewide network. The network provides primary and secondary schools with modem access to guidance and consulting databases, college course directories from state universities, school administration information, teacher availability databases, bulletin board systems, and news.

New York

Current projects in New York include:

- **NYNET Project**, a collaborative effort of Syracuse University, Columbia University, and several school districts that tests high-bandwidth interactive learning applications;
- **Technology Network Ties**, the Education Department's administrative telecommunications network, created in conjunction with the Board of Cooperative

- Educational Services and regional information centers;
- Statewide distance learning for credit programs and public television programming, supported by the State University of New York **Satellite Network** and the **New York Network**;
- **NYSERNet**, a non-profit consortium supporting Internet connection for K-12, schools, colleges and universities, libraries, and others; and
- **Project Gain** and the **Electronic Library Project**, which encourage electronic access to libraries and library access to the Internet.

North Carolina

North Carolina plans to use the **North Carolina Integrated Information Highway's** (NCIH) ability to transmit live sound and video for distance learning applications. Distance learning allows students in small, poor, or rural districts to take classes from teachers hundreds of miles away with a level of interaction that is not possible in courses that are simply broadcast over television. Teachers are able to see their students and respond to questions as if they were in the same classroom. The idea is to share academic resources such as "master teachers" and community colleges with areas that previously had no access to them. The state also plans to use distance learning in factories for worker training and in prisons for educational programs.

North Carolina has a number of educational computer networks that are used for distance learning, data transfer, and Internet connection. Many of these networks were developed as pilot projects, precursors to the development of the NCIH.

- **CONCERT** is a network serving 16 universities and private education institutions.
- The **Network for Interactive Learning** in Eastern Carolina provides telemedicine and distance learning to hospitals and community colleges in eastern North Carolina.
- VC serves sixteen high schools and university sites in the Wilmington and Charlotte areas.

North Dakota

The **Interactive Video Network** was established by the state legislature in 1993 and funded with a \$3 million appropriation and an additional \$6 million in federal grants. The network runs 18 studio sites throughout the state, transmitting two-way interactive compressed digital, visual, and audio signals. Used mainly by students and teachers for courses, workshops, and conferencing, the network offers 12 college degree programs and 65 college-level courses in 21 subjects. About 80 percent of the courses are in nursing, health-related fields, business, and education.

Sendit was created to introduce the state's educational community to the Internet by providing Internet access and email accounts to primary and secondary schools. Based at the North Dakota State University, Sendit is administered jointly by the university and the Department of Public Instruction.

Ohio

Ohio has embarked on a multimillion-dollar series of programs to put computers into schools, connect schools to telecommunications networks, and train educators on how to use the technology. Administered by the state's Department of Education in consultation with the Ohio Office of Budget and Management, Department of Administrative Services, Public Utilities Commission of Ohio, and **Ohio Educational Telecommunications Network Commission**, many of these educational uses are targeted to serve Ohio's poorest children. Some critics, however, have argued that the programs are failing to serve Ohio's poorest districts.

In January 1994 Governor Voinovich initiated **SchoolNet**, a \$95 million plan (funded by state

bonds) to wire every classroom in the state's 3,700 K-12 public schools for voice, video, and data transmission by 2000. Private contractors, chosen by school districts from a list approved by the state's Department of Administrative Services, will install the wiring. The legislation that created the program aimed to improve educational equity by providing every student with access to the information highway. It will cost about \$50 million to wire all the schools. The remaining \$45 million will be used to purchase high-end multimedia computers--teachers' workstations--for the poorest 25 percent of Ohio's school districts (most in rural Appalachia).

As a complement to SchoolNet's efforts to build telecommunications infrastructure in schools, **SchoolNet Plus** aims to put computers in all K-4 classrooms. Ohio has appropriated \$125 million for fiscal 1996 and authorized \$275 million for fiscal 1997 to purchase computers for student use. Computers will be introduced in classrooms by the 1996-97 school year. Funding is targeted so that the wealthiest third of Ohio's schools will receive funds only after the needs of poorer districts are met.

Until 1996 a pool of \$7 million in education technology equity funds was available to the poorest 20 percent of Ohio's school districts on a competitive basis to purchase technology (computers, software, and so on). With the expiration of the commission that administered these funds, the Department of Education has recommended that the funds supplement projects under SchoolNet and SchoolNet Plus.

Ameritech Corporation, the largest local telephone service provider in the state, will provide \$18 million over six years to develop **SchoolNet Telecommunity**, a program to put computers in public and private schools in Ameritech's service area. The funds are the result of a settlement made by the state's Public Utilities Commission in which a coalition of consumer and community activists alleged that Ameritech had overcharged customers. (Under the settlement Ameritech will also fund 14 community computer centers in low-income neighborhoods.) The settlement agreement may set a precedent--the commission is considering rules that would expand competition in local phone services. Consumer and low-income advocates are trying to persuade the commission to include in the local competition rules a requirement that service providers contribute to funding public telecommunications projects.

School systems in Ohio have begun to fund local telecommunications projects, either on their own or in conjunction with state programs. Columbus, for example, will spend \$5.5 million of its own funds (in addition to the \$19 million expected from SchoolNet Plus) over the next two years to train staff and put computers in K-12 schools. Columbus students can already access electronic libraries and commercial and university research centers and have started collaborative projects with students in other schools.

Businesses and school districts in Stark County created **The Education Enhancement Partnership** (TEEP) in 1990 to improve the education of K-12 students in public and private county schools. TEEP established **StarkNet**, a computer network that connects the 150 schools in the county with each other, the Internet, libraries, and colleges. TEEP's annual budget of \$1 million comes from the county's overall school budget of \$300 million.

Ohio also uses telecommunications in school administration. The **Ohio Education Computer Network** (OECN), created in 1989, provides a uniform method for school districts to track accounting and administrative information with computers. In 1994-95 the Ohio General Assembly appropriated \$20.9 million for the network. The **Education Management Information System** (EMIS) is a database of student performance and participation in school activities that is used to track state money allocated to school districts and to help identify

problems. EMIS requires information from school districts regarding students, staff, programs, services, and costs. The system will work with OECN, which will help store and distribute the data.

The rate action by the Public Utilities Commission that led to the Ameritech settlement provides an interesting window on whether Ohio's educational uses of telecommunications serve low-income students. Seeking more favorable rate regulation from the commission, Ameritech touted its commitment to building a telecommunications infrastructure in Ohio and to creating an interactive network connecting Ohio's schools. Ameritech's request and underlying claims were challenged by consumer and community advocates, who showed that it would cost schools \$35,000-50,000 to purchase the equipment needed to access Ameritech's new network. Furthermore, students who had access to computers at home would derive more benefit from the project than those who did not. In short, the greatest benefits would have accrued to wealthier school districts and to wealthier students.

The criticisms before the commission echoed the complaints of school officials in poorer districts and some state legislators, who noted that spending for telecommunications was occurring despite the fact that some schools lack basic necessities--such as electrical systems adequate to support new computers. In addition, some school districts could afford to supplement state funding for telecommunications programs, further widening the gap. Finally, advocates claimed that urban districts did not receive the benefits of telecommunications programs targeted at low-income school districts because the definition of a low-income district is based on the property tax base and so favors rural districts over urban ones. The state has been sued by six of its poorest school districts, which allege that property tax-based funding for public schools creates unconstitutional disparities between districts. The case is currently pending before the Ohio Supreme Court. Some of the targeting provisions in recent educational telecommunications legislation may have been motivated by the legislature's desire to show the courts that it will provide for the poorest school districts.

Oklahoma

The 1993 report of the Governor's Telecommunications Retreat encouraged the proposed **OneNet** network to provide financial incentives to develop a coordinated, efficient, diverse, and universally accessible online education system. The statewide network's focus on training and development applications will increase the effectiveness of education and include some investment in distance learning. And by linking universities to schools and public libraries, the network will enhance the education and training opportunities of the state's workforce.

Oregon

The Telecommunications Policy Board created **EdNet**, a privately owned online system that includes a satellite for two-way audio- and videoconferencing; varied options for conferencing allowing for presenter interaction with the audience; capacity to reach large audiences; and the ability to reach audiences in remote or rural areas, interconnect with other two-way networks, and provide high-quality visuals and graphics. Most state colleges and several health care centers and secondary schools are connected to this network for distance learning and other educational functions.

Pennsylvania

In 1993 the Commonwealth began making its private voice network, **PANET**, available to all 501 school districts. It has also opened its private data network, **IMUX**, to schools, providing them with a statewide, high-quality network offering low-cost digital, voice, and video communications.

Rhode Island

The Rhode Island Board of Governors for Higher Education recently commissioned an external report on the state of telecommunications use in Rhode Island. The report, **Telecommunications in Rhode Island Public Higher Education**, was released in March 1995. The committee charged with the investigation found that Rhode Island's public colleges and universities lag significantly behind the national average in telecommunications education and use. The committee advocated an overhaul of Board of Governors policies and practice to remedy the situation. This report recommends new planning, additional funding, pilot programs, and outreach programs.

South Dakota

The **Rural Development and Educational Bulletin Board System** became operational in 1994. This system enables students and educators to electronically exchange information and to access research institutions and universities worldwide.

The State Department of Education and Cultural Affairs was awarded a 1994 TIAP grant to plan the further expansion of the **Rural Development Telecommunications Network** and explore its educational potential. The project's goal is to reduce the telecommunications handicap faced by students in remote parts of the state, focusing on high schools with few students and those with large minority populations. The project pays for 15 additional one-way video, two-way audio videoconference sites in remote high schools, on-site and videoconference workshops for students and educators, 20 additional dial-up hosts for the **Rural Development and Educational Bulletin Board System** in remote areas, and the costs of leasing lines for Internet connectivity for these hosts for one year. As of this writing, there are 79 video-receiving sites located in high schools across the state. Over the past two years the interactive system has been used to deliver more than 140 college-level courses to nearly 2,000 South Dakota students.

Tennessee

The **Tennessee Education Network** was created through a partnership between the state telecommunications office, Department of Education (K-12), and Board of Regents System. The network's immediate priority is to computerize and link administrative data, but future plans incorporate other support and instructional services such as teacher bulletin boards, email, Internet access, and interactive video.

The **Tennessee National Information Infrastructure** aims to put schools and hospitals online and to further network accessibility, utility, and affordability. The Telecommunications Task Force hopes to obtain \$375,000 from the state government for the infrastructure.

Texas

The **Texas Educational Network** was created by the legislature in 1989 to promote the exchange of information among schools and other educational entities. Now funded by the Texas Education Agency, the network puts public school teachers and classrooms online for a \$5 annual fee. The network gives classrooms access to the Library of Congress, National Archives, and dictionary resources. It also provides toll-free numbers for users in remote areas so that isolated, economically disadvantaged schools and teachers can benefit from its resources.

Utah

Since 1990 the Utah legislature has allocated \$5 million a year to put computers into elementary schools. Because of the funding formula, rural schools may receive much more funding per student than urban schools. One study indicates that there is one computer for every ten students in Utah schools, compared with one for every fifteen students nationwide.

In 1994 the Utah legislature passed **Technology 2000**, an initiative that provides \$28 million for a sophisticated network with the capacity for interactive, full-motion video, audio, graphics, and data transmission. **UtahNet**, a communications network serving the needs of colleges and universities and K-12 schools, is the primary beneficiary through an audio-video network. Both a microwave system and a satellite system allow for interactive distance learning around the state. The Utah higher education system will receive \$9.5 million of the total funds allocated, most of which will be spent for faculty assistance and development, course development, and technology enhancements for classrooms. Full plans for Technology 2000, as well as progress to date, are available through the state's website.

EdNet, Utah's distance learning network, operates at least 65 sites in the state.

Vermont

Vermont is involved in several networking projects involving instructional and educational activities. **Vermont EDNet** connects faculty, staff, and students across the state with each other and with educational resources outside the state. A bulletin board service allows easy dial-up electronic postings of all kinds of information.

Vermont Interactive Television transmits two-way video and audio or satellite broadcast among 12 studios in the state. The network, established in 1988, is supported by federal, state, and local funds, as well as by user fees. Studio and office space are donated by host institutions, mostly educational. User fees are graduated based on type of organization and number of sites, from \$35 an hour for three sites for educational institutions to \$80 an hour for three sites for businesses.

The **Vermont Automated Library System** connects Vermont's public libraries, providing catalog cross-indexing and other data communications.

Virginia

The **Virginia Public Education Network** (PEN) was established five years ago as a text-based telecommunications system accessed mainly by modem for grades K-12. About 18,000 teachers and students now use the network, which is provided free of charge to public school educators, administrators, and students. The cost to the state is about \$1 million, mostly for the 100 toll-free lines schools use to access the network. Teachers can share lesson plans, search the Internet, or visit "Pavilions" set up on a variety of subjects. Students have used the special projects pavilion to correspond with a researcher traveling across the Pacific Ocean, to create their own home pages, and to compete against other schools on weekly math problems.

Anthology, a PEN prototype project, will bring graphical client-server architecture to the schools, allowing schools and educators to connect to and publish information on the World Wide Web. Resources available to teachers will include graphics, animation, sound, and text.

West Virginia

The **Higher Education Network Access Project** is a National Science Foundation-supported initiative that enhances communications capacities at 26 sites around the state to support K-12 educational applications. Bulletin board software and menu-driven Internet access are available, including email, Usenet news, Gopher, file transfer protocol, telnet, and web browsing applications. Local discussion groups, conferencing, and other services are also available.

The **World School Initiative** is a network access program underwritten by Bell Atlantic (under